Montana DEQ - Water Quality Standards Attainment Record

Reporting Cycle: 2016 **Assessment Record:** MT42B001_010.pdf **Status:** Unassigned

ASSESSMENT UNIT INFORMATION

Reporting Cycle:	2016
Assessment Unit:	MT42B001_010
Waterbody Name:	Tongue River
Location Description:	TONGUE RIVER, Wyoming border to Tongue River Reservoir

Water Type:	Size (Miles/Acres)	Use Class:
RIVER	5.9 MILES	B-2

Hydrologic Unit Code:	10090101
HUC Name:	Upper Tongue
Watershed:	Tongue
Basin:	Yellowstone
TMDL Planning Area:	Tongue
Ecoregion:	Northwestern Great Plains
County:	BIG HORN CO
Lat/Long AU Start (U/S):	44.995853 / -106.823902
Lat/Long AU End (D/S):	45.032761 / -106.811845

MONITORING INFORMATION

Date Assessment Started:	08/06/2008
Assessed By:	Sada, Rosie

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CITATIONS

Citation	Location	Biological Data	Habitat Data	Chemistry Data
U.S. Department of Health, Education and Welfare, Public Health Services (1961), Summary Report on Quality of Interstate Waters: Tongue River (Wyoming-Montana)	DEQ Metcalf Stacks			General; quantitative physical data
U.S. Department of Health, Education and Welfare, Public Health Services (1963), Summary Report on Quality of Interstate Waters: Tongue River (Wyoming-Montana)	DEQ Metcalf Stacks			General; quantitative physical data
Gore, James A. (1976), In-stream Flow Requirements of Benthic Macroinvertebrates in a Prairie River (Master's Thesis)	DEQ Metcalf Stacks	algae; macroinvertebrates		common ions, pH, conductivity, miscellaneous; quantitative physical data
Bahls, Loren L. ; Bahls, Peggy A. (1977), Algae of the Tongue River System, Montana and Wyoming	DEQ Metcalf Stacks	algae; chlorophyll; macroinvertebrates		common ions, pH, conductivity, miscellaneous
Elser, Allen A. ; Gorges, Mark William ; Morris, Lani M. (1980), Distribution of Fishes in Southeastern Montana	DEQ Metcalf Stacks	fish		
Van Voast, Wayne A. ; Thompson, Keith S. (1982), Estimates of Post-Mining Water Quality for the Upper Tongue River, Montana and Wyoming, Hydrogeologic Map 5	DEQ Metcalf Stacks			common ions, pH, conductivity, miscellaneous; toxicity tests
Bahls, Loren L. ; Weber, Erich E. ; Jarvie, John (1984), Ecology and Distribution of Major Diatom Ecotypes in the Southern Fort Union Coal Region of Montana, Geological Survey Professional Paper 1289	DEQ Metcalf Stacks	algae		metals
Graham, Patrick J. (1987), Montana Warm Water Fish Management Plan	DEQ Metcalf Stacks	fish	riparian &/or instream surveys & physical features	quantitative physical data

Citation	Location	Biological Data	Habitat Data	Chemistry Data
Graham, Patrick J. (1987), Montana Warm Water Fish Management Plan	DEQ Metcalf Stacks	fish	riparian &/or instream surveys & physical features	quantitative physical data
Dalby, Charles E. (1996), Potential Effects of Future Water Allocation on Water Quality of the Tongue River (Revised Draft)	DEQ Metcalf Stacks	algae; fish; macroinvertebrates		benthic sediment data; common ions, pH, conductivity, miscellaneous; metals
U.S. Department of the Interior, Bureau of Reclamation (1996), Tongue River Basin Project Environmental Impact Statement, Southeastern Montana	DEQ Metcalf Stacks	algae; fish; macroinvertebrates		common ions, pH, conductivity, miscellaneous; quantitative physical data
(1997), Pre 1997 Field Assessments	Assessment Record	algae; chlorophyll; fecal coliforms; fish; macroinvertebrates	Land use; photo points; riparian &/or instream surveys & physical features	Rosgen type; benthic sediment data; bioaccumulation; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
Warmwater Fish Management Plan Team (1997), Montana Warmwater Fisheries Management Plan 1997-2006	DEQ Metcalf Stacks	fish		quantitative physical data
U.S. Geological Survey (199n), USGS Water Data for the Nation - NWIS	Assessment Record	algae; chlorophyll; fecal coliforms; fish; other bacteriological data	Land use; riparian &/or instream surveys & physical features	benthic sediment data; bioaccumulation; common ions, pH, conductivity, miscellaneous; major nutrients; metals; organics; quantitative

Citation	Location	Biological Data	Habitat Data	Chemistry Data
				physical data
Bahls, Loren L. (2001), Support of Aquatic Life Uses in the Tongue River of Southeastern Montana Based on the Composition and Structure of the Benthic Algae Community, DEQ Contract No. 200012-3	DEQ Metcalf Stacks	algae		
(2001), DEQ Field Assessment Form	Assessment Record	algae; chlorophyll; fish	Land use; photo points; riparian &/or instream surveys & physical features	Rosgen type; benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
Bollman, Wease (2002), Bioassessment of Seven Sites on the Tongue River: Big Horn, Rosebud, and Custer Counties, Montana: September 2001	DEQ Metcalf Stacks	General; macroinvertebrates		
(2002), DEQ Field Assessment Form	Assessment Record	algae; chlorophyll; fish; macroinvertebrates	Land use; photo points; riparian &/or instream surveys & physical features	Rosgen type; benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
Bollman, Wease (2003), Aquatic Invertebrates and Habitat of Tongue and Powder River Drainages: October 15-18, 2002	DEQ Metcalf Stacks	macroinvertebrates		
Suplee, Michael W. (2005), Best Use of the June 2005 Nutrient Data Statistical Summaries	DEQ Metcalf Stacks	algae		major nutrients
Feldman, David L. (2006), A Report to the DEQ Water Quality Planning Bureau on the Proper Interpretation of Two Recently Developed	DEQ Metcalf Stacks	macroinvertebrates		

Citation	Location	Biological Data	Habitat Data	Chemistry Data
Macroinvertebrate Bioassessment Models				
Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]	DEQ Metcalf Multimedia Case	General; algae; chlorophyll; fecal coliforms; fish; macroinvertebrates; other bacteriological data	General; Land use; riparian &/or instream surveys & physical features	General; Rosgen type; benthic sediment data; common ions, pH, conductivity, miscellaneous; imagery data; major nutrients; metals; organics; quantitative physical data
Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]	DEQ Metcalf Multimedia Case	General; algae; chlorophyll; fecal coliforms; fish; macroinvertebrates; other bacteriological data	General; Land use; riparian &/or instream surveys & physical features	General; Rosgen type; benthic sediment data; common ions, pH, conductivity, miscellaneous; imagery data; major nutrients; metals; organics; quantitative physical data
Cannon, Michael ; Nimick, David A. ; Cleasby, Thomas E. ; Kinsey, Stacy M. ; Lambing, John H. (2007), Measured and Estimated Sodium-Adsorption Ratios for Tongue River and its Tributaries, Montana and Wyoming, 2004-06, Scientific Investigations Report 2007-5072	DEQ Metcalf Stacks			common ions, pH, conductivity, miscellaneous; metals
Environmental Protection Agency ; Tetra Tech, Inc. (2007), Modeling the Tongue River Watershed with LSPC and CE-QUAL-W2, Final Draft	DEQ Metcalf Stacks	chlorophyll	Land use	common ions, pH, conductivity, miscellaneous; major nutrients; quantitative physical data

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Citation	Location	Biological Data	Habitat Data	Chemistry Data
Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT	DEQ Metcalf Stacks	chlorophyll; fish; macroinvertebrates	photo points; riparian &/or instream surveys & physical features	common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
(2010), DEQ Reference Site Monitoring	Assessment Record	algae; chlorophyll; fish; macroinvertebrates	photo points; riparian &/or instream surveys & physical features	Rosgen type; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data
Govan, Sybil (nnnn), Natural Resources Information System	Montana State Library	fecal coliforms; fish	General; Land use; photo points; riparian &/or instream surveys & physical features	benthic sediment data; common ions, pH, conductivity, miscellaneous; major nutrients; metals; quantitative physical data

Comments: DATA NOT EXAMINED: Data was screened and only data post-2000 was considered for this assessment.

Previously assessed by Rosie Sada on 7/12/2006.

DATA MATRIX
Biological Data

Comments: Few recent fish sampling events have occurred in the Tongue River above the reservoir. The only sampling event post 2000 occurred on 7/19/04. The only data supplied was tolerance and number of species. For this sampling event, 3% of the population was considered intolerant and 27% tolerant. There were 12 species found, 3 of which were native. The population was dominated by Rock Bass. Sampling suggests use of this river reach by migrating sauger and walleye in the spring for spawning when sufficient flows exist. Six macroinvertebrate samples (5 plus 1 replicate) were collected in this segment of the Tongue River from 2001 through 2005. The individual MMI scores were: 62.71, 45.00, 37.61, 41.35, 48.23, & 33.1. The RIVPACS scores were: 1.10, 0.82, 0.68, 0.96, 0.79, & 0.93. Applying the plains MMI threshold of 37, all but one sample derived scores close to but above this benchmark. Applying the RIVPACS value of 0.8, all samples were close to or above this benchmark.

Overall, scores are generally close to the established impairment threshold but the majority of the scores express conditions similar to established reference. No impairment is suggested by both models. A discriminatin efficiency (DE) was calculated for each MMI. This value defines the level of confidence the assessor should have for an MMI score by measuring how well an MMI corrrectly detects stressed conditions. The DEs are the percentage of impaired sites that fall below a given point (10th percentile of the reference site distribution for each MMI). The DE for the plains metric battery is 54.8%. This translates into a 45.2% chance the impairment associated with the metric score could also be seen at reference sites; sensitivity to impairment is very poor. A single algae sample was collected in August of 2001 below Squirrel Creek. A red algae that is an indicator of clean water was present in the sample. Diatoms dominated the sample. Species richness and diversity suggests good to excellent biological integrity. The sampled assemblage suggests some stress but overall good biological integrity.

Chl-a was only measured 2 times and both values were low (below 50 mg/m^2).

Wyoming border to the Tongue River Reservoir

Data Type	Comments	Ref Num	Citation
algae	data out of date and does not reflect current conditions	126	Bahls, Loren L. ; Bahls, Peggy A. (1977), Algae of the Tongue River System, Montana and Wyoming
algae	data out of date and does not reflect current conditions	1016	Bahls, Loren L. ; Weber, Erich E. ; Jarvie, John (1984), Ecology and Distribution of Major Diatom Ecotypes in the Southern Fort Union Coal Region of Montana, Geological Survey Professional Paper 1289

Data Type	Comments	Ref Num	Citation
algae	Sample was collected in August of 2001 below Squirrel Creek. The samples consisted mostly of moss. 6 genera of non-diatom algae present, lowest in the collected samples on the Tongue River. A red algae that is an indicator of clean water was present in the sample. Diatoms dominated the sample. Species richness and diversity suggests good to excellent biological integrity. The sampled assemblage suggests some stress but overall good biological integrity. There are no developed tools that have been proven to segregate natural vs. anthropogenic disturbance or impairment vs. fully supporting based upon periphton flora at this time for this ecoregion.	2446	Bahls, Loren L. (2001), Support of Aquatic Life Uses in the Tongue River of Southeastern Montana Based on the Composition and Structure of the Benthic Algae Community, DEQ Contract No. 200012-3
chlorophyll	(DR8 Citation: NWIS. 2008. Water Chemistry Data. Downloaded on 2/06/2008.) Chl-a was only measured 2 times and both values were low (below 50 mg/m^2).	2772	U.S. Geological Survey (199n), USGS Water Data for the Nation - NWIS
fish	Data out of date and does not reflect current conditions.	971	Elser, Allen A. ; Gorges, Mark William ; Morris, Lani M. (1980), Distribution of Fishes in Southeastern Montana
fish	(DR8 Citation: FWP. 1987. Montana Warm Water Fish Management Plan, MP-21) Data out of date and does not reflect current conditions.	1893	Graham, Patrick J. (1987), Montana Warm Water Fish Management Plan
fish	(DR8 Citation: DNRC. 1996. Tongue River Basin Project - Feis, MDNRC). Tongue River contains a viable Rock Bass population. MT FWP's application for reservation of water in the Yellowstone River basin (1976) lists 14 species present from the WY border to the reservoir, including sauger, walleye, smallmouth bass, channel catfish, and rock bass. Sampling suggests use of this river reach by migrating sauger and walleye in the spring for spawning when sufficient flows exist.	2599	U.S. Department of the Interior, Bureau of Reclamation (1996), Tongue River Basin Project Environmental Impact Statement, Southeastern Montana
fish	(DR8 Citation: FWP. 1997. Montana Warm Water Fish	1894	Warmwater Fish Management Plan Team

Data Type	Comments	Ref Num	Citation
	Management Plan, MP-44) Data out of date and does not reflect current conditions.		(1997), Montana Warmwater Fisheries Management Plan 1997-2006
fish	Few recent sampling events have occurred in the Tongue River above the reservoir. The only sampling event post 2000 occurred on 7/19/04. The only data supplied was tolerance and number of species. For this sampling event, 3% of the population was considered intolerant and 27% tolerant. There were 12 species found, 3 of which were native. The population was dominated by Rock Bass. Without an appropriate reference stream, it is difficult to analyze the available data.	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT
fish	(DR8 Citation: Stewart, P. 1990. WQB Montana Reference Stream Fish Survey Form.) Data quality is low. Report covers from Prairie Dog Creek (WY) downstream to Tongue River Dam. 27 total species present, 9 native species. 2 sunfish species, 4 sucker species. Species present: brown trout, rainbow trout, mountain whitefish, northern pike, yellow perch, black crappie, yellow bullhead, rock bass, mountain sucker, pumpkinseed, smallmouth bass, white crappie, river carpsucker, carp, stonecat, shorthead redhorse, white sucker, longnose sucker, longnose dace, walleye, sauger, largemouth bass, green sunfish, black bullhead, flathead chub, golden shiner, and goldfish.	10101	(2010), DEQ Reference Site Monitoring
macroinvertebrates	This report does not apply to this stretch of the river. Only applies below the reservoir.	10639	Gore, James A. (1976), In-stream Flow Requirements of Benthic Macroinvertebrates in a Prairie River (Master's Thesis)
macroinvertebrates	The Biotic index value (5.38) was the highest out of 5 samples collected in the Tongue River. However 6 mayfly taxa were also present. These findings suggest was quality was good but water temperatures may have been warm; severe nutrient enrichment or inorganic pollutios do not appear to limit the	516	Bollman, Wease (2002), Bioassessment of Seven Sites on the Tongue River: Big Horn, Rosebud, and Custer Counties, Montana: September 2001

Data Type	Comments	Ref Num	Citation
	benthic community. Benthic substrates appear to be comprised of both hard clean surfaces as well as areas of fine sediments as implied by the presence of 10 "clinger" taxa and the abundance (42%) of the burrowing mayfly. Instream habitats were most likely diverse, the site supported the largest number of taxa among the sampled sites. The calculated MMI for the assemblage was 33.1. The RIVPACs score for the sample was 0.93. Models don't agree so impairment decisions will rely on the RIVPACs score. Using the RIVPACs score, conditions similar to established reference are suggested. No impairment is implied.		
macroinvertebrates	Site sampled fell near the confluence with Squirrel Creek, just over the WY border into MT. A composited reachwide sample and a composited targeted riffle sample were both collected. Both samples had relatively low biotic index and abundant mayfly fauna imply good water quality. The fauna present denote warmer water temperatures but some groundwater may have influence the reach here, expressed by the abundance of flatworms. Eleven "clinger" taxa and and a rich caddisfly fauna suggest substrates free of fine sediments. Other habitat types were apparently present as demonstrated by high taxa richness and abundant predators. The calculated MMIs for the reachwide and targeted riffle samples were 45.0 and 37.6, respectively. The RIVPACs score for the reachwide and targeted riffle samples were 0.82 and 0.68, respectively. Models don't agree so impairment decisions will rely on the RIVPACs scores. Using the RIVPACs score, the scores express conditions similar to established reference. No impairment is suggested. Same data is summarized in reference 18 (Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT).	10447	Bollman, Wease (2003), Aquatic Invertebrates and Habitat of Tongue and Powder River Drainages: October 15-18, 2002

Data Type	Comments	Ref Num	Citation
macroinvertebrates	The MMI score is an average of the individual metric scores. Each metric in the battery measures a predictable attribute of benthic macroinvertebrate communities to make inferences regarding aquatic life condition when pollution or pollutants affect stream systems and instream biota. A discriminatin efficiency (DE) was calculated for each MMI. This value defines the level of confidence the assessor should have for an MMI score by measuring how well an MMI corrrectly detects stressed conditions. The DEs are the percentage of impaired sites that fall below a given point (10th percentile of the reference site distribution for each MMI). The DEs are 90.9%, 70.6%, and 54.8% for the mountain, low valley, and plains MMIs, respectively. MMI impairment thresholds represent the point where DEQ technical staff believed macroinvertebrates are affected by some kind of impairment. These thresholds were set at 63, 48, and 37 for the mountain, low valley and plains indices, respectively. The RIVPACS model compares the taxa that are expected at a site under a variety of environmental conditions with the actual taxa found when the site was sampled. The impairment threshold for all Montana streams is 0.8. The RIVPACS model has a bidirectional response to nutrient enrichment. Nutrient enrichment may increase the macroinvertebrate population diversity before eventually decreasing it. An upper limit was set to flag these situations. The 90th percentile of reference was selected deriving a value of 1.2 to account for these situations. However, scores >1.0 are considered unimpaired for all other stressor types. The standard error is 0.17 for the RIVPACS model. When working in the Northwestern Great Plains and model scores don't agree, the assessor should use the RIVPACS score due to the low DE in the plains region.	4923	Feldman, David L. (2006), A Report to the DEQ Water Quality Planning Bureau on the Proper Interpretation of Two Recently Developed Macroinvertebrate Bioassessment Models

Data Type	Comments	Ref Num	Citation
macroinvertebrates	Five samples (4 plus 1 replicate) were collected in this segment of the Tongue River from 2002 through 2005. The individual MMI scores were: 62.71, 45.00, 37.61, 41.35, & 48.23. The RIVPACS scores were: 1.10, 0.82, 0.68, 0.96, & 0.79. Applying the plains MMI threshold of 37, all derived scores were close to but above this benchmark. Applying the RIVPACS value of 0.8, 3 of the samples are similar to reference and 2 are not similar. Overall, scores are generally close to the established impairment threshold but 8 of the 10 scores express conditions similar to established reference. No impairment is suggested by both models.	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT

In Wyoming

Data Type	Comments	Ref Num	Citation
fish	Data out of date and does not reflect current conditions.	971	Elser, Allen A. ; Gorges, Mark William ; Morris, Lani M. (1980), Distribution of Fishes in Southeastern Montana
fish	(DR8 Citation: FWP. 1987. Montana Warm Water Fish Management Plan, MP-21) Data out of date and does not reflect current conditions.	1893	Graham, Patrick J. (1987), Montana Warm Water Fish Management Plan
fish	(DR8 Citation: FWP. 1997. Montana Warm Water Fish Management Plan, MP-44) Data out of date and does not reflect current conditions.	1894	Warmwater Fish Management Plan Team (1997), Montana Warmwater Fisheries Management Plan 1997-2006

Entire Reach

Data Type	Comments	Ref Num	Citation
algae	(DR8 Citation: Field Report Form 1990)	10472	(1997), Pre 1997 Field Assessments

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DATA MATRIX

Habitat Data

Comments: Grazing and farming is common on this stretch but doesn't extend throughout the entire segment. The Tongue River channel is incised and constrained by a terrace in a broad valley. There has been moderate impact observed from sediment input from banks; vertical and horizontal channel erosion is common. The bank erosion was rated as natural but aggravated by livestock use in areas of grazing. Banks were rated as having substantial instability (21-40% of total) with an average size of eroding banks greater than 3' tall and more than 20' long. The substrate was rated as diverse with gravel, cobble, and boulders with sediment deposition observed in the entire channel. Pools were rated as common and well developed. Vegetative bank stability was rated as good to fair; vegetative zone extends more than 100' from the channel. Some impacts due to overgrazing were observed in limited areas. Good vegetation age class distribution was observed; seedling, sapling, pole, and mature age classes all present. The vegetation types present have good binding rootmass to stabilize banks. Common thistle and common tansy present.

No evidence of salinization was observed to be present. Aquatic plant growth was present but not common and appears normal for the stream setting and season. Filamentous algae rated as moderate (10-40% cover), macrophytes rated as heavy (40-75%), large and small woody debris was sparse. Photos show arid upland grasslands with erodible soils. Bank vegetation is comprised of some cottonwoods, a couple woody shrubs, and the rest of the area is filled by herbaceous species. The channel has nearly vertical eroding banks (high water). Substrate is diverse with cobble and gravel in riffles with soft sediments in runs/pools. Water is slightly turbid with a green tint. A salt crust is observed but not extensive on the channel margin that was inundated by water earlier in the season; with in the high water mark. All observed aspects appear in range with natural channel dynamics.

Wyoming border to the Tongue River Reservoir

Data Type	Comments	Ref Num	Citation
photo points	Photos show arid upland grasslands with erodible soils. Bank vegetation is comprised of some cottonwoods, a couple woody shrubs, and the rest of the area is filled by herbaceous species. The channel has nearly vertical eroding banks (high water). Substrate is diverse with cobble and gravel in riffles with soft sediments in runs/pools. Water is slightly turbid with a green tint. A salt crust is observed but not extensive on the channel margin that was inundated by water earlier in the season; with in the high water mark. All aspects appear in range with natural channel dynamics.	4648	(2001), DEQ Field Assessment Form
riparian &/or instream surveys & physical	(DR8 Citation: Field Report Form 1990) Stream channel slope is between 1-3% with vertical and horizontal channel erosion	10472	(1997), Pre 1997 Field Assessments

Data Type	Comments	Ref Num	Citation
features	common. Grazing and farming is common on this stretch and ranges from waters edge to >200' from channel margins. There is moderate impact observed from sediment input from banks. The banks erosion was rated as natural but aggravated by livestock use Banks were rated as having substantial instability (21-40% of total) with an average size of eroding banks >3' tall and >20' long. This vertical erosion rated as mostly natural "but grazing adds to the problem." Substrate was rated as diverse with gravel, cobble, and boulders with sediment deposition observed in the entire channel. Pools rated as common and well developed. Vegetative bank stability rated as good to fair and vegetative zone extends >100' from the channel. Some impacts due to overgrazing was observed in some areas. No salinization was present. Aquatic plant growth was present but not common and appears normal for the stream setting and season.		
riparian &/or instream surveys & physical features	Area has a good willow community with some evidence of light beaver use. No apparent grazing use of vegetation; old fence along riparian area. Common thistle and common tansy present. Good vegetation age class distribution; seedling, sapling, pole, and mature age classes all present. Evidence of ice scour on left bank on cottonwood trees. Vegetation types present have good binding rootmass to stabilize banks. Livestock use rated as causing low disturbance. Channel is incised and constrained by a terrace in a broad valley. Filamentous algae rated as moderate (10-40% cover), macrophytes rated as heavy (40-75%), large and small woody debris was sparse	4649	(2002), DEQ Field Assessment Form

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DATA MATRIX

Chemistry Data

Comments:

TSS ranged from 3- 697 mg/L with a mean of 53 mg/L for the entire period of record at the Stateline USGS gage. There are no numeric standards for suspended sediment. The Tongue River has naturally high TSS due to soils, geology, and topography. However, there are anthropogenic sources and sinks in the watershed, the net effects of which are unknown. TSS does not appear to be causing impairment in the Tongue River above the reservoir. Physical surveys in 2002 included Rosgen channel type and a pebble count on riffle and pool. There is a bimodal distribution due to the abundance of particles less than 1mm observed in the pebble count. This may be due to the count including pools; removing the particles less than 1mm produces a bell-shaped distribution. Rosgen channel type is an F4. This channel type is most likely natural due to the highly erodible soil types. Nutrient data from USGS gage 06306300, Tongue River at State Line nr Decker, MT was compared to seasonally stratified nutrient guidance by ecoregion derived by DEQ. Northwestern Great Plains was the predominant ecoregion by land area but the upper Tongue River originates in the Big Horn mountains. This hydrologic influence from the mountains may supply colder, cleaner water than reflected in the derived great plains numbers. All nutrient constituents were present in generally low concentrations. A few elevated values were analyzed and found to occur during spring runoff, comprising less than 10% of the period of record. No indication of nutrient impairment. The only metals data (Total recoverable and total) considered was from May 15, 2001 through May 15, 2006 from the stateline USGS gage (06306300). The only metal to exceed standards was iron. Seven (13%) of iron samples exceed the chronic aquatic life standards criteria. All of these exceedances occured during spring runoff or growing season. Salinity (expressed as SC) and Sodium Adsorption Ratio (SAR) standards specifically for the Tongue River mainstem are set for the growing and non-growing season and include monthly average criteria as well as instantaneous maximum criteria. There were no instantaneous maximum criteria exceedances for the period of record at the Stateline. For the monthly average; a minimum of 4 samples per month was used to calculate averages. All of these months with 4 or more samples (in the last 5 years) had average salinity and SAR values below standard criteria. There is a strong relationship (R2 = 0.715) relative to the rest of the stations analyzed between SC and flow; SC increases significantly with decreased flow. SAR increases in the downstream direction. The relationship between SAR and flow is strongest (R2= 0.8044) at the stateline USGS gage. Sulfate concentrations ranged from 16- 302 mg/L with an average concentration of 116 mg/L at the stateline USGS gage. Sulfates are generally a threat to agricultural uses because of the potential to increase stream salinity. Data has shown that salinity is not a problem in this segment of the Tongue River, therefore sulfate will not be considered a probable cause of impairment to beneficial uses. Water rights show there are 4 statements of claim and 4 water reservations in the short segment above the reservoir. There are a couple irrigated crop fields adjacent to the river. The spatial extent of potential irrigated land is limited due to the topography of the land. Flow statistics from 2000-2007 were analyzed to assess potential for alterations impacting beneficial uses. The minimum flows were below 10 cfs during low flow times but median and mean flows were approximately 80-90 cfs. The majority of the low flow periods occurred in 2001 and 2006, low precipitation years.

Wyoming border to the Tongue River Reservoir

Data Type	Comments	Ref Num	Citation
Rosgen type	Channel slope: 0.13% over 400 feet; Width/depth ratio: 63; Entrenchment ratio: 1.4; D50: 49.9mm; Sinuousity: 1.67. Channel type is an F4. This channel type is most likely natural due to the erodible soil types. There is a possiblity this channel could have originally been a C type channel that incised significantly due to impacts.	4649	(2002), DEQ Field Assessment Form
common ions, pH, conductivity, miscellaneous	This report does not apply to this stretch of the river. Only applies below the reservoir.	10639	Gore, James A. (1976), In-stream Flow Requirements of Benthic Macroinvertebrates in a Prairie River (Master's Thesis)
common ions, pH, conductivity, miscellaneous	data out of date and does not reflect current conditions	1100	Van Voast, Wayne A. ; Thompson, Keith S. (1982), Estimates of Post-Mining Water Quality for the Upper Tongue River, Montana and Wyoming, Hydrogeologic Map 5
common ions, pH, conductivity, miscellaneous	Same data is covered in reference 11 (U.S. Department of the Interior, Bureau of Reclamation 1996).	864	Dalby, Charles E. (1996), Potential Effects of Future Water Allocation on Water Quality of the Tongue River (Revised Draft)
common ions, pH, conductivity, miscellaneous	(DR8 Citation: DNRC. 1996. Tongue River Basin Project - Feis, MDNRC). Average concentrations: Sulfate 156 mg/L; TDS 410 mg/L, SC 659 umhos/cm. MBMG recommends maximum contaminant concentrations for drinking water and livestock use. Recommended sulfate is 250 mg/L for drinking water and 1500 mg/L for livestock. TDS recommendations are 500 mg/L for drinking water and 5000 mg/L for livestock.	2599	U.S. Department of the Interior, Bureau of Reclamation (1996), Tongue River Basin Project Environmental Impact Statement, Southeastern Montana
common ions, pH, conductivity, miscellaneous	(DR8 Citation: Storease Reports) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]

Data Type	Comments	Ref Num	Citation
common ions, pH, conductivity, miscellaneous	Same data is covered in reference 22 (Environmental Protection Agency ; Tetra Tech, Inc. (2007), Modeling the Tongue River Watershed with LSPC and CE-QUAL-W2, Final Draft).	12225	Cannon, Michael ; Nimick, David A. ; Cleasby, Thomas E. ; Kinsey, Stacy M. ; Lambing, John H. (2007), Measured and Estimated Sodium-Adsorption Ratios for Tongue River and its Tributaries, Montana and Wyoming, 2004-06, Scientific Investigations Report 2007-5072
common ions, pH, conductivity, miscellaneous	This document explains the process for and reports the results of selecting, setting up, and calibrating the computer models that were created to support development of the Assessment Report (reference 18 - Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT). Overall, the models largest limitation came from a lack of data, especially weather and water quality data. Because of the data shortage, the model was never formally validated. Without other assessment methods and/or data to define the "natural" condition, and/or monitoring data to spatially or temporally isolate individual sources, model simulation is the only option for prediction of the water quality condition. So long as the model results are used with caution and uncertanty is acknowledged, the model is well suited for this purpose. The LSPC model is driven by precipitation and other climatological data. The average area per weather station used in this modeling effort was 338 square miles. The extrapolation of precipitation from a limited number of points is believed to be one of the largest sources of model error. The storage and management of water from the Tongue River Reservoir also proved to be a major limitation to the model performance. There was generally insufficient water chemistry data to calibrate to all potential conditions throughout the	12121	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Modeling the Tongue River Watershed with LSPC and CE-QUAL-W2, Final Draft

Data Type	Comments	Ref Num	Citation
	watershed, such as storm events, low flows, high flows, and spring snowmelt. On average, one water chemistry station was used to calibrate 450 square miles of watershed area. Use of the LSPC model for the prediction of average daily SC or SAR for a given day would likely be unreliable. On the other hand, predictions at the monthly or greater time step are generally good to very good (plus or minus 15% or less and plus or minus 15 to 25%, respectively). In the absence of field data describing the hydrologic and pollutant fate/transport characteristics associated with many factors and nutrient sources, it was not possible to specifically calibrate SC, SAR, and nutrient loading from these sources. These sources were addressed in the model using a literature-based understanding of their characteristics.		
common ions, pH, conductivity, miscellaneous	Salinity standards (represented as SC) specifically for the Tongue River mainstem are set for the growing and non-growing season and include monthly average criteria as well as instantaneous maximum criteria. There were no instantaneous maximum criteria exceedances for the period of record at the Stateline. For the monthly average; a minimum of 4 samples per month was used to calculate averages. In the last five years at the stateline USGS gage, there were 39 months and 16 months with 4 or more samples for the growing and non-growing season, respectively. All of these months with 4 or more samples (in the last 5 years) had an average salinity value below standard criteria. There is a strong relationship (R2 = 0.715) relative to the rest of the stations between SC and flow; SC increases significantly with decreased flow. Sodium Adsorption Ratio (SAR) standards specifically for the	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT

Data Type	Comments	Ref Num	Citation
	Tongue River mainstem are set for the growing and non-growing season and include monthly average criteria as well as instantaneous maximum criteria. There were no instantaneous maximum criteria exceedances for the period of record at the Stateline. For the monthly average; a minimum of 4 samples per month was used to calculate averages. In the last five years at the stateline USGS gage, there were 39 months and 16 months with 4 or more samples for the growing and non-growing season, respectively. All of these months with 4 or more samples (in the last 5 years) had an average salinity value below standard criteria. SAR increases in the downstream direction. The relationship between SAR and flow is strongest (R2= 0.8044) at the stateline USGS gage. Sulfate concentrations ranged from 16- 302 mg/L with an average concentration of 116 mg/L at the stateline USGS gage. Sulfates are generally a threat to agricultural uses because of the potential to increase stream salinity. Data has shown that salinity is not a problem in this segment of the Tongue River, therefore sulfate will not be considered a probable cause of impairment to beneficial uses.		
major nutrients	(DR8 Citation: NWIS. 2008. Water Chemistry Data. Downloaded on 2/06/2008.) Data from USGS gage 06306300, Tongue River at State Line nr Decker, MT. Data was compared to seasonally stratified nutrient guidance values by ecoregion derived by DEQ. Northwestern Great Plains was the predominant ecoregion by land area but the upper Tongue River originates in the Big Horn mountains. This hydrologic influence from the mountains may supply colder, cleaner water than reflected in the derived great plains numbers. Ammonia results were very low, usually below detection. Total N and	2772	U.S. Geological Survey (199n), USGS Water Data for the Nation - NWIS

Data Type	Comments	Ref Num	Citation
	TKN were below Northwestern Great Plains nutrient guidance. 3 of 36 NO2+NO3 (8%), 2 of 25 orthophosphate (8%), and 1 of 69 total P (1.5%) results are above the nutrient guidance. Most of these elevated concentrations were found to be elevated during spirng runoff. NO INDICATION OF IMPAIRMENT DERIVED FROM NUTRIENT RESULTS.		
major nutrients	Seasonally stratified nutrient guidance by ecoregion. Level IV ecoregion guidance is derived and applied when a sufficient amount of data is available. For parameters lacking data for level IV, guidance was developed for level III ecorgion. 90th percentile of reference was used as guidance for the recreation, aquatic life, and cold-water fishery beneficial uses.	10811	Suplee, Michael W. (2005), Best Use of the June 2005 Nutrient Data Statistical Summaries
major nutrients	(DR8 Citation: Storease Reports) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]
metals	(DR8 Citation: Storease Reports) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]
metals	The only metals data considered was from May 15, 2001 through May 15, 2006 at the stateline USGS gage (06306300). This data set included total recoverable metals and total metals results. Seven (13%) of iron samples exceed the chronic aquatic life standards criteria with an average 108% increase from the standard threshold. Five of seven of the results are within 12% of the standard, one was 168% and the other was 753% of the chronic threshold. These two large	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT

Data Type	Comments	Ref Num	Citation
	values above criteria were both during spring runoff. All of these exceedances occured during spring runoff or growing season [May (3), June (3), and July (1)]. No other sampled metals were above the standards criteria.		
quantitative physical data	(DR8 Citation: NWIS. 2008. Water Chemistry Data. Downloaded on 2/06/2008.) Flow statistics from 2000-2007 were analyzed to assess potential for alterations impacting beneficial uses. The minimum flows were below 10 cfs during low flow times but median and mean flows were approximately 80-90 cfs. The majority of the low flow periods occurred in 2001 and 2006, low precipitation years.	2772	U.S. Geological Survey (199n), USGS Water Data for the Nation - NWIS
quantitative physical data	10/15/2002: Dissolved O2: 11.7 mg/L; water temp: 8.5ºC; conductivity: 3000 us/cm; Flow: 406.317 cfs. Pebble count on riffle and pool: 21% less than 1mm, 23% less than 2mm, 29% less than 6mm. There is a bimodal distribution due to the abundance of particles less than 1mm. This may be due to the pebble count including pools. Subtract the particles less than 1mm produces a great distribution.	4649	(2002), DEQ Field Assessment Form
quantitative physical data	TSS concentrations ranged from 3- 697 mg/L with a mean of 53 mg/L for the entire period of record at the Stateline USGS gage. There are no numeric standards for suspended sediment. The Tongue River has naturally high TSS levels due to soils, geology, and topography. However, there are anthropogenic sources and sinks in the watershed, and the net effect from the sources and sinks is unknown. The Tongue River mainstem was compared to 14 other rivers. The rivers selected are not intended to represent "reference" conditions; some are even listed as impaired for TSS or siltation. Also, several of the rivers have major dams and reservoirs that complicate the river hydrology and sediment	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT

Data Type	Comments	Ref Num	Citation
	transport. The periods of record of TSS data for each of these waters varies and the data from each site do not necessarily reflect similar climatic and hydrologic conditions. The median concentrations for all sites in the Tongue River, for both the grab and continuous data, fall within the lower 25th percentile of the data set. TSS does not appear to be causing impairment in the Tongue River above the reservoir.		
quantitative physical data	(DR8 Citation: 2008. Digital Atlas. DNRC Points of Diversion. Tongue River, Bighorn County. Downloaded 5/06/08.) The map shows the points of diversions in this segment of the Tongue River. There are 4 statement of claims and 4 water reservations in the short segment above the reservoir. There are a couple irrigated crop fields adjacent to the river. The spatial extent of potential irrigated land is limited due to the topography of the land.	10090	Govan, Sybil (nnnn), Natural Resources Information System

In Wyoming

Data Type	Comments	Ref Num	Citation
common ions, pH, conductivity, miscellaneous	(DR8 Citation: Storease Reports-Wyoming) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]
common ions, pH, conductivity, miscellaneous	The largest relative increase of mean SAR occurs between Dayton and Monarch, WY with an average increase of 0.02 per river mile. The second largest relative increase of mean SAR occurs between Monarch, WY and the state line with an average increase of 0.01 per river mile.	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT
major nutrients	(DR8 Citation: Storease Reports-Wyoming) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division,

Data Type	Comments	Ref Num	Citation
			Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]
metals	(DR8 Citation: Storease Reports-Wyoming) data out of date and does not reflect current conditions	10255	Montana Department of Environmental Quality, Planning, Prevention and Assistance Division, Water Quality Planning Bureau (2006), STORET/Storease Data Archive [Electronic Resource]
quantitative physical data	TSS increases from Dayton to the State Line USGS gages.	12226	Environmental Protection Agency ; Tetra Tech, Inc. (2007), Water Quality Assessment for the Tongue River Watershed, Montana - FINAL DRAFT

ASSESSMENT HISTORY

Cycle 2006

1996: Listed for flow alteration. 2000-2006: Insufficient data to assess the following uses: aquatic life, warm water fisheries, drinking water and contact recreation. This segment was previously listed in 2000 as fully supporting for agriculture and industry. However, data was not documented to verify this call. Because of the TMDL pending deliverables, this segment will remain not assessed for all its uses.

Cycle 2008

1996: This segment of the Tongue River was included on the 1996 303(d) list as having the cold-water fishery, aquatic life, and agriculture beneficial uses partially supporting due to flow alteration from agriculture, irrigated crop production, and natural sources. 2000-2006: In 2000, DEQ assessed the data quantity and quality to be insufficient to make an impairment determination for the aquatic life, cold water fishery, warm water fishery, drinking water, or recreation beneficial uses. The agriculture and industry beneficial uses were assessed to be fully supporting. 2008: This segment of the Tongue river will remain listed as having the aquatic life and cold water fishery beneficial uses non supporting due to low flow alterations and iron from irrigated crop production, impacts from hydrostructure flow regulation/modification, streambank modifications/destabilization, and natural sources.

Cycle 2010

Not assessed this cycle

Reporting Cycle: 2016 **Assessment Record:** MT42B001_010.pdf **Status:** Unassigned

Cycle 2012

Not assessed this cycle

Cycle 2014

Not assessed this cycle

Cycle 2016

Not assessed this cycle

Overall Condition of Segment

This segment of the Tongue River was listed in 1996 for flow alteration; to be protective, it will remain listed for flow alterations since there are numerous water diversions above the reservoir. It will also be listed for iron since 7 of 53 samples taken between May 2001-May 2006 exceeded the chronic criterion of 1000 ug/l. No other metals exceeded the numeric standard in the same timeframe. Available nutrient data and moderate aquatic plant growth suggested no impairment. TSS concentrations ranged from 3- 697 mg/L with a mean of 53 mg/L for the entire period of record at the Stateline USGS gage. The Tongue River has naturally high TSS levels due to soils, geology, and topography although there are possible anthropogenic sources. More data analyses are required to determine the effect of natural versus anthropogenic sources.

Salinity (expressed as SC) and Sodium Adsorption Ratio (SAR) standards specific to the Tongue River mainstem are set for the growing and non-growing season and include monthly average criteria as well as instantaneous maximum criteria. For the monthly average, a minimum of 4 samples per month was used to calculate the monthly average, and only the last 5 years were considered for the calculation since there was no continuous data collection previous to that. For the instantaneous maximum criteria, all years and data types were included. There was a single maximum criteria exceedance (3000 uS/cm) in 2002, whereas all the monthly averages were below the numeric standard. Since the majority of the data correspond to the monthly averages, and no exceedances were found, EC will not be considered an impairment. Sulfate concentrations ranged from 16- 302 mg/L with an average concentration of 116 mg/L at the state line USGS gage. Sulfates are generally a concern to agricultural uses because of the potential to increase stream salinity. Since salinity is not a problem in this segment, sulfates will not be considered as a probable cause of impairment.

Reporting Cycle: 2016 **Assessment Record:** MT42B001_010.pdf **Status:** Unassigned

USE SUPPORT DECISION

Use Class B-2

Trophic Status: **Trophic Trend:**

Uses	DQA	Method, Data, and Information Used	Assessment Type and Confidence	Use Support	Partial Flag	Use Support Certainty	Threatened
Aquatic Life		230, 320, 330, 340, 375	BIOLOGICAL-FAIR, HABITAT-GOOD, PHYSICAL/CHEMICAL-GOOD	Not Fully Supporting	No	Low	No
Agricultural		230	PHYSICAL/CHEMICAL-FAIR	Fully Supporting	No		No
Drinking Water		230, 375	PHYSICAL/CHEMICAL-FAIR	Fully Supporting	No		No
Primary Contact Recreation		230, 340, 375	PHYSICAL/CHEMICAL-FAIR	Fully Supporting	No		No

Method Number and Description
230-Fixed station physical/chemical (conventional plus toxic pollutants)
320-Benthic macroinvertebrate surveys
330-Fish surveys
340-Primary producer surveys (phytoplankton/periphyton/macrophyton)
375-Visual observation, may not quantify some parameters; single season; by prof.

Reporting Cycle: 2016 **Assessment Record:** MT42B001_010.pdf **Status:** Unassigned

IMPAIRMENT INFORMATION

Uses	Cause (Confidence): Source(Confirmed)	Observed Effects
Aquatic Life	260 (Low): 58 (N), 66 (N), 125 (N), 155 (N) 270 (Low): 58 (N), 66 (N), 125 (N)	
Agricultural		
Drinking Water		
Primary Contact Recreation		

Cause Number and Description	Source Number and Description	Observed Effect Number and Description
260-Iron 270-Low flow alterations	58-Impacts from Hydrostructure Flow Regulation/modification 66-Irrigated Crop Production 125-Streambank Modifications/destabilization 155-Natural Sources	

DELISTING / STATUS CHANGES

Cause	Reason for Change	Date of Change

Reporting Cycle: 2016 **Assessment Record:** MT42B001_010.pdf **Status:** Unassigned

CATEGORY INFORMATION

Previous Cycle

Cycle	2014
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A

Current Cycle

Cycle	2016
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A